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सतही क्रियाशील अभिकर्ता – निबंधन की शब्दावली

(पहला पुनरीक्षण)

Indian Standard

SURFACE ACTIVE AGENTS — GLOSSARY OF TERMS

(First Revision)

ICS 71.100.40

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

October 2001 **Price Group 8**

Soaps and Other Surface Active Agents Sectional Committee, CHD 25

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Soaps and Other Surface Active Agents Sectional Committee had been approved by the Chemical Division Council.

The standard was originally published in 1974 with a view to eliminate the ambiguity and confusion from different interpretation of the terms used in the field of surface active agents, this revision is brought out with a view to harmonize it alongwith relevant International Standard (ISO 862 'Surface active agents — Vocabulary'). In this revision the terminology about certain raw materials, which are typically used in India and as given in Amendment No. 1, August 1982 are also included. Slight modifications have been made from those prescribed in ISO 862 on the terminology of, ancillary, filler, builder and soap.

Should any difference exist between the definitions in this standard and those in the standard for individual materials, the latter shall prevail.

This standard is intended chiefly to cover the technical definitions of terms and it may not necessarily include all the legal meanings of the terms.

Composition of the Committee responsible for formulation of this standard is given in Annex A.

Indian Standard

SURFACE ACTIVE AGENTS — GLOSSARY OF TERMS

(First Revision)

1 SCOPE

This standard defines terms frequently used in the field of surface active agents.

NOTES

1 Some terms dissociated or not from their definition can appear as commercial terms according to their usage or to their mode of presentation; under no circumstances may their definitions be used as reference definitions for the commercial terms.

2 Other terms which appear non-specific to surface active agents, are nevertheless widely used in this field.

3 The standard gives, in particular, specific terms for textiles applications, dry cleaning, etc, but terms for other applications may be introduced.

2 CLASSIFICATION

2.1 These terms have been grouped according to the classifications given below.

2.2 Product Designation

2.2.1 *General Terms*

2.2.2 *Commercial Terms According to their Uses*

2.3 Special Properties of Surface Active Agents

2.3.1 *Continuous Systems*

2.3.1.1 *General physical properties*

2.3.1.2 *Surface properties*

2.3.2 *Dispersed Systems*

2.3.2.1 *General colloidal properties*

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2.3.4 *Structural Properties*

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2.4.1 *Manufacture of Soap*

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2.4.3 *Raw Materials for Detergent Formulations*

2.5 Application of Surface Active Agents

2.5.1 *Dry Cleaning*

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2.5.5.2 *Auxiliary products for weaving*

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2.5.5.5 *Other auxiliary products for textiles*

2.5.6 *Other Applications*

2.5.7 *Washing*

2.5.8 *Wetting*

2.6 General Terms Non-Specific to the Field of Surface Active Agents

3 TERMINOLOGY

The definitions of technical terms, classification-wise, are prescribed in **4** to **8.**

4 PRODUCT DESIGNATION

4.1 General Terms

4.1.1 *Detergent* — A product specially formulated for cleaning through the process of detergency.

NOTE — A detergent comprises essential components (surface active agents) and generally complementary components (builders etc).

4.1.2 *Soap* — A product specifically formulated and manufactured for use as a detergent and is predominantly the alkali/ammonium salt of mixtures of fatty acids containing at least 8 carbon atoms.

NOTES

1 In practice, part of the fatty acids may be replaced by rosin acids.

2 Generally the term 'metallic soap' is limited to the salts of fatty acids and non alkali metals. In practice these salts are insoluble in water and do not possess detergent properties.

4.1.3 *Surface Active Agent* — A chemical compound possessing surface activity which, dissolved in a liquid in particular in water, lowers the surface tension or interfacial tension, by preferred adsorption at the liquid/vapour surface, or other interfaces.

NOTE — A chemical compound including in its molecule at least one group with an affinity for markedly polar surfaces, ensuring in most cases its dissolution in water, and a non-polar group which has little affinity for water.

4.2 Commercial Terms According to Their Usage

4.2.1 *Raw Materials*

4.2.1.1 *Acid oil* — It is normally produced by acidulation of soap stock and contain neutral oil, fatty acids and different levels of other lipids but having free fatty acids more than 35 percent by mass.

4.2.1.2 *Castor olein and castor oleo-stearin* — Castor oil contains mostly hydroxy acid, namely ricinoleic acid. To make it suitable for soap manufacture, the hydroxy group is eliminated by chemical processing. The resulting product may be designated as castor olein or castor stearin depending on their conformity with the following specification:

Product	*Specification*
a) Castor olein	1) Hydroxyl value — 0 to 20, 2) Iodine value — 41 to 90.
b) Castor oleo-stearine	1) hydroxyl value — 0 to 20, 2) Iodine value — 10 to 40.

4.2.1.3 *Distilled fatty acids* — These are technical grade of fatty acids which are subsequently distilled having specific free fatty acids and colour.

4.2.1.4 *Processed Fixed Oils* — Vegetable oils, animal fats and marine oils processed individually or in blends to remove their objectionable impurities or even chemically modify their composition to make them suitable for the manufacture of soap.

NOTE — Normally, vegetable oil industry uses processes such as refining, blooming by clay and/or carbon, hydrogenation or simple deodorization or splitting. However, the following oils need additional processing by other special methods, some of which are given below:

Oils	*Special Methods*
a) Kusum oil - contains about 65 percent cyanogenic lipids	Preferential hydrolysis of cyanogenic lipids
b) Neem - contains high levels of catalyst poisons and bitter principles	Liquid-liquid extraction, high vacuum distillation or chemical treatment
c) Karanjia - contains phenolic causing soap colour to darken	Liquid-liquid extraction, high vacuum components distillation or chemical treatment
d) Castor oil - contains hydroxy group and one double bond	Chemical dehydroxylation for making paint oil or dehydroxylation and suitable hydrogenation for making olein or stearin or combined dehydrate hydrogenation
e) Non-edible rice bran oil with FFA - contains oxidized-polymerized fatty acids which interfere in bleaching, refining and hydrogenation	Physical refining, bleaching by chemical more than 20 treatment solvent precipitation, etc
f) Tree-born oils, such as rubber seed-oil-containing polymerized, material dark colour - strong odour, non-triglycerides and other impurities	Generally liquid-liquid extraction, chemical modification, high temperature stripping, column absorption and such other processes not conventional in vegetable oil industry are required to upgrade the oil

4.2.1.5 *Pure fatty acids* — These are distilled and fractionated fatty acids, for example, lauric acid, stearic acid, etc.

4.2.1.6 *Semi-acid oil* — It is partially acidulated soap-stock and eliminates most of the water content of soap-stock thus giving transport economy but at the same time should not be highly acidic. It consists of soap, fatty acids, neutral oil and water.

4.2.1.7 *Spent bleaching earth* — It is produced during bleaching of oils and fats by the process of adsorption bleaching and contains fatty matter, soap, bleaching earths, and other impurities.

4.2.1.8 *Undistilled fatty acids* — Produced by splitting of triglycerides and have free fatty acids, minimum of 90 percent by mass.

4.2.2 *Detergent Intermediates*

4.2.2.1 *Soap-stock* — It is soap containing material not completely freed of unsaponified material or other impurities. It is normally produced in the removal of free fatty acids from triglycerides during neutralization.

4.2.2.2 *Sodium alkyl aryl sulphonate, technical* — It is the sodium salt of alkyl aryl sulphonic acid containing at least 40 percent of active ingredient.

4.2.2.3 *Sodium oleostearate, technical, stabilized* — It is sodium salt of fatty acids comprising chiefly oleic and stearic acids with added preservatives and necessary electrolytes. It may be built or unbuilt but in a form not suitable for direct domestic use.

5 SPECIAL PROPERTIES OF SURFACE ACTIVE AGENTS

5.1 Structural Properties

5.1.1 *Anionic Surface Active Agent* — A surface active agent which ionizes in aqueous solution to produce negatively charged organic ions which are responsible for the surface activity.

5.1.2 *Cationic Surface Active Agent* — A surface active agent which ionizes in aqueous solution to produce positively charged organic ions which are responsible for the surface activity.

5.1.3 *Non-ionic surface active agent* — A surface active agent which does not produce ions in an aqueous solution. The solubility in water of non-ionic surface active agents is due to the presence in the molecules of functional groups which have a strong affinity for water.

5.1.4 *Ampholytic Surface Active Agent* — A surface active agent which has two or more functional groups which, depending on the conditions of the medium, can be ionized in an aqueous solution and give to the compound the characteristics of either an anionic or a cationic surface active agent.

This ionic behavior is similar to that of amphoteric compounds in the broadest sense.

5.1.5 *Amphiphilic Product* — A product, the molecule of which contains both one or more hydrophilic groups and one or more lipophilic groups.

NOTE — Surface active agents are amphiphilic compounds.

5.1.6 *Hydrophilic Group* — A molecular group having an endophilic behavior in relation to water.

5.1.7 *Hydrophobic Group* — A molecular group having an exophilic behavior in relation to water.

5.1.8 *Lipophilic Group* — A molecular group having an endophilic behavior in relation to a non-gaseous, non-polar organic phase.

5.1.9 *Polar Group* — A functional group in which the electron distribution gives rise to a significant electric dipole moment. Such a group is responsible for the affinity for markedly polar surfaces and for water in particular, and for the hydrophilic character of the molecule.

5.1.10 *Non-polar Group* — The organic part of a molecule, in which the electron distribution does not give rise to a significant electric dipole moment. Such a group is responsible for the affinity for organic solvents of low polarity and consequently for the lipophilic character of the molecule.

5.1.11 *Hydrophilic-lipophilic Ratio* — The relative importance of the polar group(s) and of the non-polar part affecting the affinities of the molecule for water and for organic solvents of low polarity respectively.

NOTE — This definition relates only to emulsifying agents.

This term is also known as hydrophilic-lipophilic-balance (HLB).

5.1.12 *Polar Non-polar Structure* — The structure of a molecule which includes at least one polar group and a large non-polar group. Such a structure is responsible for the hydrophilic and lipophilic characteristics of the molecule.

5.2 Continuous Systems

5.2.1 *General Physical Properties*

5.2.1.1 *Cloud Temperature* — The temperature above which aqueous solutions of certain non-ionic surface active agents become heterogeneous by the separation into two liquid phases (coacervation).

NOTE — The value of the cloud temperature depends on the concentration of the solution.

5.2.1.2 *Krafft temperature* — The temperature (in practice, a narrow range of temperatures) at which the solubility of ionic surface active agents rises sharply. At this temperature the solubility becomes equal to the critical micellization concentration (c.m.c).

In the soap industry the term 'Krafft Point' is defined as the temperature below which a transparent soap solution becomes cloudy.

5.2.1.3 *Temperature of clarification* — The temperature at which the mixture of two liquid phases of aqueous solution of certain non-ionic surface active agents exhibiting a cloud temperature, becomes homogeneous on cooling.

NOTE — The temperature of clarification is often determined as 'cloud point'.

5.2.2 *Surface Properties*

5.2.2.1 *Adsorption layer of surface active agents* — A layer of surface active agents in solution stretching more or less across an interface and the thickness of which is governed by the fact that, at any random location in that layer, the concentration of the adsorbed product is greater than that in each of the contiguous phases.

5.2.2.2 *Capillary activity* — The action of a surface active agent in solution caused by its adsorption at interface which, generally, decreases the surface and interfacial tensions.

5.2.2.3 *Contact angle* — The angle formed at a point on the line of contact of three phases of which at least two are condensed phases, by the tangents to the curves obtained by intersecting a plane perpendicular to the line of contact with each of the three phases *(see* Fig. 1).

EXPLANATORY NOTE

In considering three phases a, p and 8, there are three surfaces of contact which, taken in pairs are αβ, βδ, and αδ.

These three surfaces of contact have a common line of separation. At any random point M there is only one plane which is perpendicular to that common line. This is plane P.

This plane intersects the surface αβ along the curve PAB and the surface αβ along the curve PAC.

On place P the curves PAB and PAC subtend an angle θ_C which is the contact angle at the point M of phase β with phases α and δ.

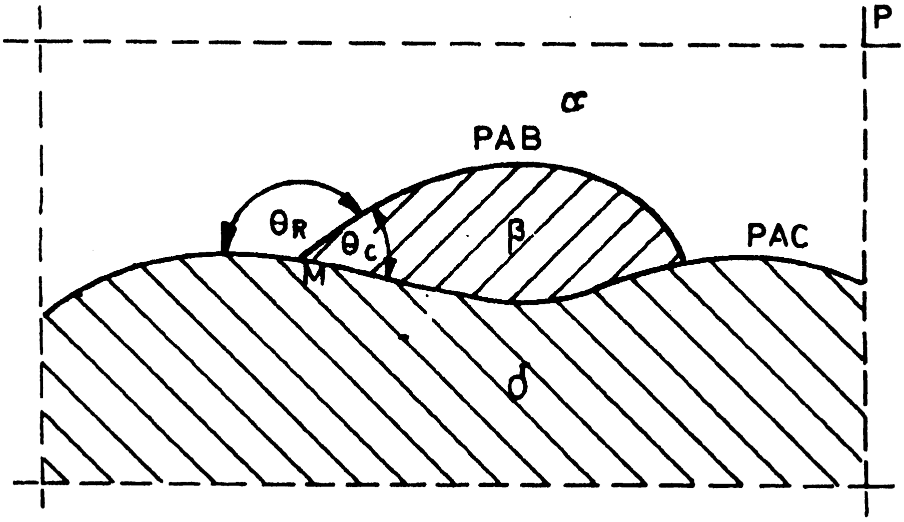

FIG. 1 CONTACT ANGLE

The figure shows:

a) the one of the phases, phase β, must be liquid, that another phase, phase δ, may be solid or liquid and that the third phase, phase α, may be gas or liquid; and

b) that at the contact of the liquid phase with a solid phase, two supplemental angles are formed - contact angle between the liquid phase and the two others (German-Randwinkel) and the angle Θ_R, sometimes called junction angle between the liquid phase and the solid phase.

Experimentally, when a liquid is contacted with a solid and another phase, it is usually observed that the contact angle does not reach its equilibrium value instantaneously. The same is true when liquid in contact with a solid is displaced. Therefore, one distinguishes an advancing and a receding contact angle respectively.

5.2.2.4 *Differential surface work* — The work *dW*s required to increase the area of the liquid surface by *dS,* under reversible, isothermal and isobaric conditions. This work corresponds to the Gibbs energy required to transfer molecules from the interior of a liquid to its surface; it is proportional to the increase of area dS multiplied by a coefficient γ:

$$dW_s = \gamma dS$$

The coefficient of surface work y is expressed in joules per metre square and has the same numerical value as surface tension expressed in millinewtons per metre.

The surface tension is the intensive variable in the differential expression for the work required to increase the area of the liquid.

NOTES

1 The surface tension and the (differential) surface work can be illustrated by considering a thin liquid film stretched across a frame with one movable side of length 1.

To maintain this side in a fixed position, a force F must be exerted outwards and prependicular to 1 in the plane of the thin film.

The magnitude of the force is:

$$F = 2\gamma l$$

where γ is the surface tension and the coefficient 2 results from the thin film having two faces.

In the case of a small displacement *dx* of *l*, with/being displaced in parallel direction to itself, the work done on the surface will be:

$$dW = Fdx = 2\gamma l\, dx = \gamma dS$$

where *dS* is the overall increase in area of both faces of the thin film.

Therefore the coefficient of surface work per unit area is equal to:

$$\frac{dW}{dS} = \gamma$$

which has the same numerical value as the surface tension.

2 When the surface tension (for interfacial tension is measured under non-equilibrium conditions, it is called dynamic surface (or interfacial) tension as opposed to the so-called static surface (or interfacial) tension measured at equilibrium.

5.2.2.5 *Film* — A thin layer of matter (in most contexts less than a few micrometres thick), homogeneous or not.

5.2.2.6 *Interfacial tension* — The tension at the interface between two phases.

NOTE — The interfacial tension is expressed in millinewtons per metre (mN/m).

5.2.2.7 *Monomolecular layer; monolayer* — The adsorption layer of a surface active agent in which all adsorbed molecules are in contact with the surface layer of the adsorbent.

5.2.2.8 *Spreading ability* — The property of a liquid, particularly of a solution of surface active agents, which enables a drop of this liquid to cover spontaneously another liquid or solid surface.

5.2.2.9 *Surface activity* — The action of a substance that modifies the physical (mechanical, electrical, optical, etc) properties of a surface or an interface and reduces its surface tension or interfacial tension.

5.2.2.10 *Surface phenomena* — Phenomena, whose mechanical, electrical, optical, etc, effects become manifest at the interface separating two phases (liquid-gas, liquid-solid, liquid-liquid or gas-solid).

5.2.2.11 *Surface tension* — The tension acting in the surface of a phase, directed towards the interior of a phase, caused by intermolecular attractions between the molecules at the surface and those located below the surface.

NOTE — The surface tension is expressed in millinewtons per metre (mN/m).

The term surface tension means the special case of forces at the interface between liquid and gaseous phase.

5.2.2.12 *Work of cohesion per unit area* — The work done under isothermal and isobaric conditions to separate reversibly normal to its axis a liquid (or solid) column, and to form two new surfaces, each of unit area. This work is numerically equal to twice the surface tension:

$$W_C^{\alpha} = 2\gamma\alpha$$

5.2.2.13 *Work of adhesion or of separation per unit area* — The work done on the system when two condensed phases α and β having an interface of unit area are separated under reversible, isothermal and isobaric conditions to form unit areas of each phase.

In the case of two liquids, L_1 and L_2 Dupres relation relates the work of adhesion and the surface and interfacial tensions of L_1 and L_2

$$W_A^{L_1L_2} = \gamma^{L_1} + \gamma^{L_2} + \gamma^{L_1L_2}$$

where

$\gamma^L{}_1$ = is the surface tension of liquid L_1,

$\gamma^L{}_2$ = is the surface tension of liquid L_2, and

$\gamma^{L}{}_{1}{}^{L}{}_{2}$ = is the interfacial tension of the two liquids L_1 and L_2.

In the case of a solid-liquid system, in which the solid is not perfectly wetted by the liquid, the work of adhesion per unit area is related to the contact angle θ_C and to the surface tension of the liquid by Young's equation:

$$W_A{}^{LS} = \gamma^L\cos\theta_C + \gamma^L = \gamma^L\,(\,1 + \cos\theta_C\,)$$

5.2.2.14 *Work of immersional wetting per unit area; wetting tension* — The work which is gained, under reversible, isothermal and isobaric conditions, when a unit area of a substrate is wetted in such a way that the free surface of the wetting liquid does not change.

This work is equal to the difference between the surface energy of the wetted substrate and the interfacial energy between the substrate and the wetting liquid:

$$W_w{}^{SL} = \gamma^S - \gamma^{SL}$$

It is numerically equal to the product of surface tension and the cosine of the advancing contact angle.

$$W_w{}^{SL} = \gamma^L\cos\theta_a$$

In the case where the wetting liquid is a solution, the phenomenon is accompanied by adsorption and the definition must be considered as applying to the wetting of an infinitely small element of surface. The relevant variable then corresponds to the partial differential of the work gained in relation to the wetted area.

NOTE — Following the usual thermodynamic conventions the equation should correspond rather to work of dewetting, but it is usual always to consider the absolute value of this quantity.

5.2.2.15 *Work of dewetting* — The work required to dewet, under isothermal, isobaric and reversible conditions, a unit area of a substrate without change in the free surface area of the wetting liquid.

It is numerically equal to the product of surface tension and the cosine of the receding contact angle:

$$W_D = \gamma^L\cos\theta_r$$

NOTE — Theoretically the work of dewetting and the work of wetting should be equal in absolute value. In practice this is not the case because equilibrium is attained with difficulty during an experiment. Hysteresis phenomena, among others, are the causes of the differences found.

5.2.2.16 *Work of spreading per unit area; spreading tension* — The work which is gained, under reversible, isothermal and isobaric conditions, when a liquid placed on another liquid or on a solid spreads in such way that both the interfacial area and the surface area of the upper liquid increase by one unit.

This work is equal to the difference between the work of adhesion of the two condensed phases present, and the work of cohesion of the spreading liquid.

$$W_{spr} = W_A{}^{\alpha\beta} - W_B{}^{\alpha} = \gamma^{\alpha} + \gamma^{\beta} - \gamma^{\alpha}\beta - 2\gamma^{\alpha} = \gamma^{\beta} - \gamma^{\alpha} - \gamma^{\alpha}\beta$$

Spreading will take place when the expression is positive.

5.3 Dispersed Systems

5.3.1 *General Colloidal Properties*

5.3.1.1 *Dispersion* — A system consisting of two or more phases one of which is continuous and at least one other is finely dispersed.

5.3.1.2 *Dispersed phase* — The discontinuous phase of a dispersion.

5.3.1.3 *Dispersion medium* — The continuous phase of a dispersion.

5.3.1.4 *Emulsion* — A heterogeneous system of two or more liquid phases, consisting of a continuous liquid phase and at least one other liquid phase dispersed into the first in the form of small droplets.

5.3.1.5 *Peptization* — The formation of a stable dispersion from flocs or aggregates.

5.3.2 *Properties of the Dispersed Phase*

5.3.2.1 *Coalescence* — The disappearance of the boundary between two droplets in contact, or between a droplet and a bulk phase, followed by changes of shape leading to a reduction of the total surface area.

5.3.2.2 *Flocculate; floc* — Matter which has undergone flocculation.

5.3.2.3 *Protective colloid* — A substance which, within a certain concentration range and when acting as a lyophilic colloid, retards or prevents the aggregation of the particles of a lyophobic dispersion.

5.3.2.4 *Sedimentation* — The accumulation under the influence of gravity or centrifugal force of particles dispersed in a fluid medium.

5.3.3 *Rheological Properties*

5.3.3.1 *Anti-thixotropy* — Increase of viscosity or consistency under isothermal and reversible conditions, by the application of shear from the viscosity or consistency at rest (immediately after beginning to shear) to the final value (dependent on the magnitude of the shear rate).

When the shear is discontinued, the viscosity at rest must be re-established within a certain time, the 'time of thixotropic recovery'.

5.3.3.2 *Dilatancy* — Increase of the apparent viscosity or consistency under isothermal and reversible conditions and without hysteresis with increasing rale of shear.

5.3.3.3 *Plasticity* — A plastic body behaves as an elastic body when it is subjected to a stress less than a critical value, o. the 'yield stress'. Above this limiting value, a flow takes place. When the function $D = f(\tau)$ (D is the rate of shear) for $\tau \geq \tau_0$ is represented by a straight line, the substance is said to follow the Bingham model.

5.3.3.4 *Rheological hysteresis* — It the shear rate under isothermal and reversible conditions is increased linearly with respect to time from zero to a maximum value (up-branch) and then decreased in the same manner (down-branch), the rate of shear-diagram shows a hysteresis loop, which is used to detect and to characterize thixotropy or antithixotropy.

5.3.3.5 *Rheopexy* — The phenomenon in which the time of thixotropic recovery, after discontinuation of a relatively high shear rate, is shortened by applying a small shear rate.

5.3.3.6 *Shear thinning* — Reduction of the apparent viscosity or consistency under isothermal and reversible conditions and without hysteresis with increasing rate of shear.

5.3.3.7 *Thixotropy* — Reduction of viscosity or consistency, under isothermal and reversible conditions, by the application of shear from the viscosity or consistency at rest (immediately after beginning to shear) to a final value (dependent on the magnitude of the shear rate).

When the shear is discontinued, the viscosity or consistency at rest must be re-established within a certain time, the 'time of thixotropic recovery'.

5.4 Intermolecular Actions

5.4.1 *Surface Active Agents/Solvent Molecules*

5.4.1.1 *Endophilicity* — The constitutional tendency of the whole or a part of a molecule to penetrate into, or remain within, a phase. It is characterized, in terms of the functional groups in the molecule, by the fact that the introduction of such groups in the molecules gives rise to decrease in the change of the chemical potential when the molecules of the substance pass from a gaseous ideal state to the phase under consideration.

NOTE — The value of the decrease in the change in chemical potential, which results from the introduction of the functional group, is a function of concentration and temperature. Such a group can, depending on these variables have either an endophilic or an exophilic character.

5.4.1.2 *Exophilicity* — The constitutional tendency of the whole or a part of a molecule to pass out of or not to penetrate into a phase. It is characterized, in terms of the functional groups in the molecule, by the fact that the introduction of such groups in the molecules gives rise to increase in the change of the chemical potential when the molecules of the product pass from a gaseous ideal state into the phase under consideration.

NOTE — The value of the increase in the change in chemical potential, which results from the functional group, is a function of concentration and temperature. Such a group can, depending on these variables have either an endophilic or an exophilic character.

5.4.1.3 *Hydrophily* — Endophilicity in relation to water.

5.4.1.4 *Hydrophoby* — Exophilicity in relation to water.

5.4.1.5 *Hydrotropy* — The increase in solubility of a substance which is only slightly soluble in water by the addition of a third substance.

This third substance is called a 'hydrotrope' or a 'hydrotropic agent'.

5.4.1.6 *Lipophilicity* — Endophilicity in relation to a non-gaseous non-polar organic phase.

5.4.1.7 *Lyophily* — Endophilicity in relation to a liquid phase.

5.4.1.8 *Lipophobicity* — Exophilicity in relation to a non-gaseous non-polar organic phase.

5.4.1.9 *Lyophoby* — Exophilicity in relation to a liquid phase.

5.4.1.10 *Lyotropy* — The increase in solubility of a substance which is only slightly soluble in a solvent by the addition of a third substance.

This third substance is called a 'lyotrope' or a 'lyotropic agent'.

5.4.2 *Surface Active Agents/Surface Active Molecules*

5.4.2.1 *Coacervate; coacervated phase* — The more concentrated phase of a system which has undergone coacervation.

5.4.2.2 *Coacervated system* — The totality of the phases of a system which has undergone coacervation.

5.4.2.3 *Coacervation* — The separation into liquid colloidal phases in equilibrium containing the same constituents in different proportions.

5.4.2.4 *Critical micellization concentration (C.M.C.)* — The characteristic concentration of surface active agents in solution (in practice, a narrow range of concentration) above which the appearance and development of micelles brings about sudden variation in the relation between the concentration and certain physico-chemical properties of the solution.

The critical micellization concentration is determined by the point of intersection of two extrapolated curves which represent such relations above and below the critical concentration *(see* Fig. 2).

NOTE — The value of the critical micellization concentration can depend, to a certain extent, on the property under consideration and on the method chosen to measure this property.

The following graph which illustrates this definition, represents the variation of a physico-chemical property (electrical conductivity) with concentration (square root).

5.4.2.5 *Micelle* — An aggregate made up of molecules and/or ions, which is formed above a certain critical concentration in solutions of surface active agents.

5.4.3 *Surface Active Agents/Non Surface Active Molecules*

5.4.3.1 *Chelate* — A metallic complex in which the metal ion is suppressed by chelation.

5.4.3.2 *Chelation* — The formation of complexes in which the suppressed metal ion is held in a so-called ring structure, with one or more molecules having, sometimes, several electron-donor groups.

5.4.3.3 *Completing* — The transforming of a metal cation into a new ion by the action of molecules containing at least one electron-donor group.

5.4.3.4 *Sequestration* — The masking of metallic ions dissolved in a medium, the ions being normally liable to form precipitates in the presence of certain reagents, particularly surface active agents. The masking is accomplished by the formation of complexes which remain in solution in the medium.

6 MANUFACTURE OF SURFACE ACTIVE AGENTS

6.1 Manufacture of Soap

(Technical terms cannot be used as commercial trade names.)

6.1.1 *Saponification* — A chemical reaction in which a fat is Converted into a soap by the action of a base.

NOTES

1 The term 'fats' as used in the soap industry refers to the triacylglycerols (triglycerides) (oils and fats).

2 In the saponification of a fat, glycerol is produced at the same time.

3 The term saponification is sometimes used to describe the simple neutralization of a fatty acid.

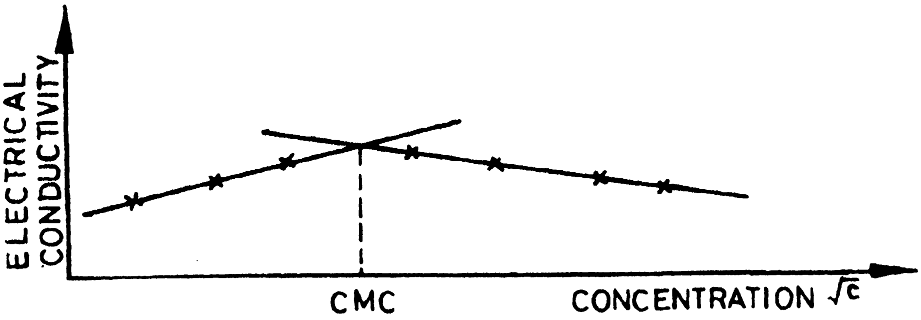

FIG. 2 VARIATION OF ELECTRICAL CONDUCTIVITY WITH CONCENTRATION

6.1.2 *Boiling; Strong Change* — The operation of completing saponification by boiling the soap mass with an excess of alkali hydroxide.

6.1.3 *Cold-process Soap* — Soap obtained by cold saponification of molten fats mixed with a cold concentrated alkali lye. The heat produced by the exothermic reaction leads to completion of the reaction. In contrast with the conventional higher temperature processes, this process can be carried out at 50°C. Usually part of the fats remains unsaponified.

6.1.4 *Finished Soap; Soap on Nigre* — Neat soap in equilibrium with the nigre and usually containing a fairly constant 62 to 65% of total fatty acids, together with small quantities of sodium hydroxide, sodium chloride and glycerol.

6.1.5 *First Change; Killing* — The conversion by saponification of a fatty matter, to produce a soap mass which has a homogeneous appearance.

6.1.6 *Fitting Lye* — Lye corresponding to nigre in equilibrium with the neat soap during fitting. The electrolyte content is easily determined by fast cooling of the nigre, from which electrolyte separates spontaneously.

NOTE — Analysis of the composition of the filling lye permits control of fitting.

6.1.7 *Fitting; Pitching; Finishing* — The final soap-making operation by which the soap, after addition of water and/or an appropriate electrolyte solution, passes from one of the following equilibrium states with two or three phases in order to obtain a viscosity that permits good separation of the phases:

a) grained soap - lye,
b) neat soap - nigre, and
c) neat soap- nigre - lye.

The phases of the soap which are separated are respectively the following:

a) soap on lye, and
b) and c) soap on nigre.

6.1.8 *Graining Out* — The addition of electrolytes (salt or alkali hydroxide) to a soap in order to obtain grained soap in equilibrium with a soap-free lye and drawing off water allowing the separation of glycerol.

6.1.9 *Grained Soap; Curd Soap; Kettlewax* — The state of soap in the pan, appearing in the form of 'flocks or grains' of concentrated soap, in equilibrium with a lye in which the electrolyte content is equal to or higher than that defined by the graining point.

6.1.10 *Graining Point (Point PG on the Ternary Diagram)* — The lowest concentration of lye at which grained soap appears.

6.1.11 *Invariant Zone*—The region of a ternary phase diagram where three phases can coexist in equilibrium.

This region is represented by a triangle. The different points within an invariant zone correspond to equilibria of three phases of constant composition where only the proportion of the phases varies.

Figure 3 gives a typical diagram of phases of a soap, in which the phases are numbered 1 to 5.

In this diagram, the invariant zones interesting the soap manufacturer are the narrow triangles A and B.

6.1.12 *Limiting lye (point E on the ternary diagram)* — The lowest concentration of lye at which soap is no longer dissolved. This concentration depends, on the temperature considered as fixed in soap manufacture (90 to 100°C), and also on the nature of the saponified fatty matter and on that of the electrolyte. This is a characteristic of the fats used in soap manufacture.

6.1.13 *Lye* — A solution of electrolytes, practically soap free, separated from the grained soap by graining out and by washing.

6.1.14 *Middle Soap; Gum Soap* — An anisotropic phase of soap of lower concentration than neat soap in a plastic sticky state. It is practically transparent and often looks like a compact, relatively immobile mass of rubbery consistency.

NOTE — Its formation is usually undesirable, and results from too low a concentration of electrolytes, due either to saponification with insufficient alkali or to excessive dilution with water.

Its formation produces undue thickening of the soapy mass, which becomes difficult to handle or to redissolve.

6.1.15 *Mottled soap* — Soap having coloured streaks.

6.1.16 *Neat soap* — The phase of soap with a lamellar structure which can exist in the presence of small quantities of electrolytes.

6.1.17 *Nigre* — An isotropic solution of soap containing electrolytes, which is separated from the neat soap after the fitting process.

6.1.18 *Semi-boiled soap* — Soap prepared without graining out, by saponification by boiling fats with just sufficient alkali hydroxide to complete the reaction.

NOTE — In the case of fats, the glycerol formed remains in the body of the soap.

6.1.19 *Soap on Lye* — The state of soap obtained after graining out, boiling and washing, in equilibrium

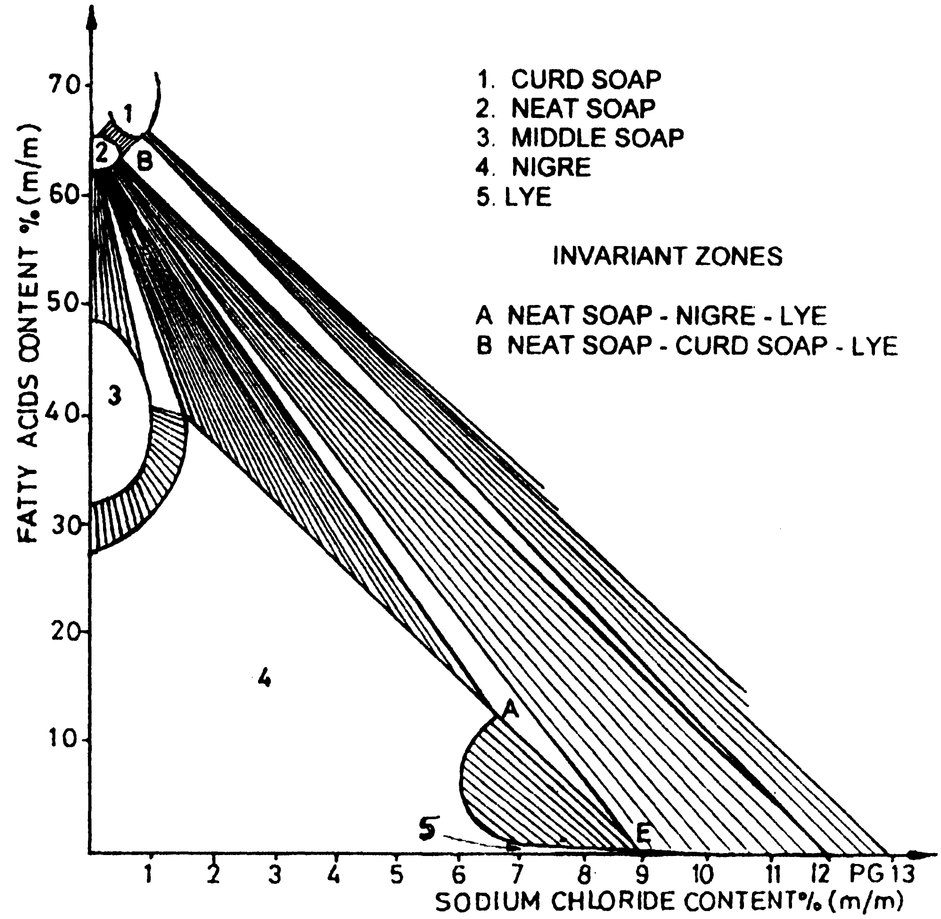

FIG. 3 PHASE DIAGRAM OF SOAP

with a lye of slightly higher concentration than limiting lye. This soap is in the state of grained soap.

6.1.20 *Soft Potassium Soap* — Semi-boiled soap of a pasty consistency obtained by reacting appropriate relatively unsaturated fats, oils or fatty acids with potassium hydroxide.

6.1.21 *Solid Soap; Alpha 'Phase'* — A crystalline form of hemihydrate soap.

NOTES

1 This form does not occur under the conditions normally encountered in commercial soap manufacture.

2 The term 'phase' appears in inverted commas as it does not refer to a phase in the thermodynamic sense.

6.1.22 *Solid Soap; Beta 'Phase'* — The physical state of the soap obtained by cooling finished soap to below 42°C or by applying of mechanical action on solid soap below this temperature.

Soaps with high beta 'phase' contents are firmer than soap with high omega 'phase' contents; they have an apparent high dissolution rate, and as a consequence they foam easily.

Soaps of low relative molecular mass (for example derived from coconut oil, palm-kernel oil, etc) are either not converted to the beta 'phase' or only form it very slowly.

NOTE — The term 'phase' appears in inverted commas as it does not refer to a phase in the thermodynamic sense.

6.1.23 *Solid Soap; Omega 'Phase'* — The physical state of finished soap that has solidified slowly; this state is stable above 70°C. Soaps with high omega 'phase' contents have a lower dissolution rate than soaps with high beta 'phase' contents, they are, moreover, less firm.

NOTE — The term 'phase' appears in inverted commas as it does not refer to a phase in the thermodynamic sense.

6.1.24 *Washing* — The conversion of grained soap into neat soap and *vice versa* by successive additions of water and of solutions of electrolytes followed by removal of lye. In a continuous process, neat soap is washed with lye slightly stronger than limiting lye.

6.2 Manufacture of Synthetic Surface Active Agents

6.2.1 *Amide Formation* — A chemical reaction resulting in the formation of amides by the action of ammonia or of primary or secondary amines on acids, their halides or their esters.

6.2.2 *Esterification* — In the particular case of surface active agents, a chemical reaction in which an ester is formed from an acid and an alcohol, enol or phenol with the elimination of water.

6.2.3 *Ethoxylation* — In the particular case of surface active agents, a chemical reaction leading to the addition of one or more molecules of ethylene oxide to a compound with labile hydrogen.

6.2.4 *Hydrolysis* — Dissociation of a compound by reaction with water. In the particular case of surface active agents, hydrolysis is more particularly the reverse action to esterification or amide formation and is characterized by the formation of an acid and of an alcohol, enol or phenol or of ammonia or an amine.

Hydrolysis of fats yields fatty acids and glycerol; hydrolysis of soap, yields fatty acids and a base.

6.2.5 *Phosphation* — In the particular case of surface active agents, a chemical reaction resulting in the formation of phosphoric esters.

6.2.6 *Phosphonation* — A chemical reaction or sequence of chemical reactions, leading to the introduction into a molecule of one or more phosphonic radicals by direct carbon phosphorus linkage.

6.2.7 *Propoxylation* — In the particular case of surface active agents, a chemical reaction leading to the addition of one or more molecules of propylene oxide to a compound with labile hydrogen.

6.2.8 *Sulphation* — A chemical reaction resulting in the formation of a sulphuric ester (In practice, a sulphuric mono-ester is obtained).

6.2.9 *Sulphonation* — A chemical reaction leading to the introduction of a sulfonyl group into a molecule by direct carbonsulfur linkage.

6.2.10 *Sulphite Addition* — Sulphonation brought about by the reaction of sulphur dioxide or more general of its derivatives (sulphites, disulfites) with an electrophilic group.

6.3 Raw Materials for Detergent Formulations

6.3.1 *Active Matter (for Detergents)* — In a formulation, the whole of the surface active agents responsible for an activity specified.

6.3.2 *Ancillary (for detergents)* — A complementary component of a detergent which imparts properties unrelated to the washing action. Ancillaries are usually present in small quantities.

> *Examples* — Optical bleaches, corrosion inhibitors, antielectrostatic agents, colouring matter, perfumes, bactericides, enzymes.

6.3.3 *Anti-redeposition Agent* — A complementary component of a detergent, usually organic, which imparts to the latter the property of preventing redeposition.

6.3.4 *Booster (for Detergents)* — A complementary component of a detergent, usually organic, which strengthens certain characteristic properties of the essential constituents.

6.3.5 *Builder (for Detergent)* — A substance to augment the detersive effects of surfactants and has the ability to remove the hardness of the wash liquor.

> *Examples* — Polyphosphate, zeolites, citrates, carbonates, silicates, etc.

6.3.6 *Chelating Agent* — A substance having a molecular structure embodying several electron-donor groups which render it capable of combining with metallic ions by chelation.

6.3.7 *Chemical Bleaching Agent* — A product which, by chemical action, usually oxidizing or reducing, acting under controlled conditions on textile or other materials, converts substances which adversely affect the appearance of the material, to substances of less intense coloration.

6.3.8 *Dispersing Agent* — A substance capable of promoting the formation of the dispersion.

6.3.9 *Filler (for Detergents)* — An organic or inorganic product usually inert, employed to produce the desired type of presentation and/or of concentration of a detergent.

> *Examples* — Sodium sulphate, sodium chloride, calcite, etc.

6.3.10 *Peptizing Agent; Peptizer* — A substance capable of promoting peptization.

6.3.11 *Sequestering Agent; Sequestrant* — A substance having functional characteristics which make it capable both of suppressing the activity of metallic ion and ensuring that these ions remain in solution.

6.3.12 *Soil Release Polymer (for Detergents)* — A polymer which enhances the removal of soil from the fabric during launderning by modification of the surface of the fabric.

6.3.13 *Structurant (detergents)* — A substance responsible for providing structure and firmness to the matrix in formulating soaps and detergent bars.

> *Example* — Starch and its derivatives, silica/sodium silicate, kaoline, hydrous alumina/alumino silicates, etc.

7 APPLICATIONS OF SURFACE ACTIVE AGENTS

7.1 Washing

7.1.1 *Antiredepositing Power* — The effectiveness of a substance for preventing insoluble particles from redepositing on the washed surface and, possibly, for maintaining the particles in suspension.

7.1.2 *Artificial Soil* — Soil of selected composition, prepared for detergency tests.

7.1.3 *Detergency; Detergence* — The process by which soil is dislodged from the substrate and brought into a state of solution or dispersion. In its usual sense, detergency has the effect of cleaning surfaces.

It is the result of the action of several physico-chemical phenomena.

7.1.4 *Detersion; Cleaning* — The act of bringing the phenomenon of detergency into effect.

7.1.5 *Dispersing Power* — The effectiveness of a product for producing a dispersion.

7.1.6 *Soil* — An undesirable deposit on the surface and/or within the substrate which changes some characteristics of appearance or feel of clean surfaces.

7.1.7 *Solubilizing Power* — The effectiveness of a dissolved surface active agent to confer on certain bodies of low solubility in the pure solvent, an apparent solubility by micelle formation.

7.1.8 *Suspending Power* — In the case of solutions of surface active agents, the effectiveness of certain substances for maintaining insoluble particles in suspension.

NOTE — The suspending power can vary considerably depending upon the nature of these particles.

7.1.9 *Washing Power* — The effectiveness of a surface active agent or of a detergent for promoting detergency.

7.2 Wetting

7.2.1 *Wettability* — The ability of a surface to become wetted.

7.2.2 *Wetting Agent* — A substance which, when introduced in a liquid, increases its wetting tendency.

7.2.3 *Wetting Power* — The effectiveness of a product for wetting of a surface.

7.2.4 *Wetting Tendency* — The tendency of a liquid to spread over a surface. A decrease in the contact angle between the solution and the surface is shown by an increase in wetting. A zero contact angle corresponds to spontaneous spreading.

7.2.5 *Wetting* — In the special case of a surface active agent in solution- action corresponding to effectuating the properties of wetting tendency and wettability.

7.3 Foaming

7.3.1 *Anti-foaming Agent; Anti-foamer* — A substance which prevents the formation of a foam or considerably reduces foam persistence.

7.3.2 *Foam Booster* — A product which increases foaming power.

7.3.3 *Foam Drainage* — The return to the bulk liquid phase of the part of liquid entrained by bubbles during foaming.

7.3.4 *Foam Persistence* — The ability of a foam to persist.

7.3.5 *Foam Stabilizer* — A product which increases the stability of a foam.

NOTE — Depending on test conditions or use, or the nature of the foaming product, the stabilization effect may cause an increase in volume of foam leading to a greater persistence of the foam produced.

7.3.6 *Foam* — A mass of gas cells separated by thin films of liquid and formed by the juxtaposition of bubbles, giving a dispersion in which a large proportion of gas by volume is dispersed in a liquid.

7.3.7 *Foaming Agent; Foamer* — A substance which, when introduced in a liquid, confers on it an ability to form a foam.

7.3.8 *Foaming* — The action causing formation of foam.

7.4 Emulsification

7.4.1 *Aqueous Emulsion (Symbol O-W; Oil in Water)* — An emulsion in which the continuous phase is aqueous.

7.4.2 *Emulsifiable Liquid* — A liquid suitable for constituting the dispersed phase of an emulsion.

7.4.3 *Emulsification* — The action causing the formation of an emulsion.

7.4.4 *Emulsifying Agent; Emulsifier* — A substance which permits or facilitates the formation of an emulsion.

7.4.5 *Emulsifying Liquid* — A liquid suitable for constituting the continuous phase of an emulsion.

7.4.6 *Emulsifying Power* — The effectiveness of a substance for facilitating the formation of an emulsion.

7.4.7 *Emulsion Persistence* — The ability of an emulsion to persist.

7.4.8 *Oil Emulsion (Symbol W-O; Water in oil)* — An emulsion in which the continuous phase is a liquid immiscible with water.

7.5 Textile Applications

7.5.1 *Auxiliary Products for Spinning*

7.5.1.1 *Fibre Humectant* — A product intended to control and maintain the desired humidity of yarns, throughout subsequent textile operations, and finally to increase the strength of the yarns.

NOTE — These products are generally solutions of wetting agents with hygroscopic agents and/or preserving agents added.

7.5.1.2 *Spinning bath additive* — A product used, amongst other things, for clarifying a spinning bath and preventing the nozzles from becoming clogged.

NOTE — These products generally are or contain surface active agents, for example, sulphated oils, alkylsulphonatcs, fatty acid condensates, oxyethyl alkalylamines, quaternary ammonium derivatives.

7.5.1.3 *Spinning oil* — A product which, when applied to fibres in the course of their preparation for spinning, makes them more slippery and more flexible and may give them other desired surface qualities (for example, cohesion) for the operations of combing, drawing and spinning. Spinning oils are also called 'batching oils, tearing oils', batching agents, spinning agents, spinning finishes, lubricants, etc.

Depending on the purpose for which they are used, spinning oils may also possess the properties of wetting agents and fulling assistants and other secondary properties, for example that of promoting the loosening of hard or stem fibres.

NOTES

1 A spinning oil is a product formulation more specifically designed for spinning.

2 These products are mainly oil- or grease-based preparations, possibly associated with emulsifying agents or with special surface active agents.

7.5.1.4 *Spinning solution additive* — A product added during the preparation of a spinning solution, in order to improve the suitability of the solution for spinning and possibly to alter the quality of the filaments.

NOTE — These products generally are or contain surface active agents, for example sulfated oils, alkylsulfonates, fatty acid condensates, oxyethyl alkaylamines, quaternary ammonium derivatives.

7.5.2 *Auxiliary Products for Weaving*

7.5.2.1 *Sizing assistant* — A product which, when added to sizing compounds, makes the warp yarns more flexible and slippery for the subsequent operation of weaving.

NOTE — These products may, for example, be sulphated or emulsified waxes and greases, possibly with the addition of wetting agents.

7.5.3 *Auxiliary Products for Textile Dyeing and Printing*

7.5.3.1 *After treating agent for prints* — A product covered by the definition corresponding to that for dye-fixing agent.

7.5.3.2 *Discharging agent* — A product which, when added to a printing paste of discharge, makes it possible to discharge colour satisfactorily in the case of a dye which is difficult to discharge.

NOTE — These products are mainly based on derivatives of quaternary ammonium and ethoxylated amines.

7.5.3.3 *Dye fixing agent* — A product intended to improve the fastness of dyes from certain points of view. To increase the rubbing fastness, use is made of detergents for the textile industry which eliminate non-fixed dye.

To increase the wetfastness, use is made of products which form with the dye stable compounds which do not dissolve easily.

NOTE — In the latter case, these products include cationic substances such as amines and amine derivatives, for example, quaternary ammonium salts and ethoxylated amines.

7.5.3.4 *Levelling agent* — A product designed to promote the even dyeing of textiles.

7.5.3.5 *Reduction inhibitor agent* — A product lessening the reducing effect of foreign matter on dyes, and consequently combatting the destruction of the latter.

NOTE — The products include, for example, preparations based on buffer substances and oxidizing substances with surface active agents such as degraded proteins, fatty acid and protein condensates, ammonium salts of alkylsulphates and alkylsulfonates.

7.5.3.6 *Solubilizing or dispersing agent for dyestuffs or pigments* — A product promoting the solubilization or the aqueous dispersion of dyes or pigments and consequently improving their dyeing properties (efficiency, penetration, etc).

NOTE — These products are surface active agents, with or without the addition of solvents, for example esters and amines of sulphated fatty acids, fatty acid condensates, alkylarylsulphonates, polyglycol esters and ethers, derivatives of aliphatic amines.

7.5.3.7 *Stripping agent, partial or total* — A partial stripping agent is intended to brighten a dye which is too dark. It acts by eliminating part of the dye. Levelling agents are suitable for this operation.

A total stripping agent, or dye-removing agent, is used to eliminate the dye from a dyed fabric. Reducing agents are generally used for this process, in conjunction with levelling agents.

NOTE — These products are or contain surface active agents such as sulphated oils, esters and amides of fatty acids, fatty acid condensates, alkylsulphates, alkylaryl sulphonates, alkyl and alkylaryl polyglycol ethers, polyglycol esters of fatty acids, amine derivatives. Agents with the properties of protective colloids, such as condensates of fatty acid and of proteins, can also be used.

7.5.3.8 *Wetting agent and dyeing oil* — A product which facilitates and accelerates the wetting power of the dye bath for the textile fabric and ensures the stability of the dyeing bath. The dyeing oil generally has an additional brightening effect on the dyed article.

NOTE — These products are or contain surface active agents such as alkylsulphates, alkylsulphonates, alkylarylsulphonates, fatty acid condensates, sulphated oils, esters of sulphosuccinic acid, also oxyalkylation products and their derivatives.

7.5.4 *Auxiliary Products for Finishing*

7.5.4.1 *Antistatic agent* — A product which, when applied to a textile article during or after processing, makes it possible to eliminate inconvenience due to electrostatic phenomena.

NOTE — These products arc generally surface active agents, for example alkylsulphonates, alkylphosphates, alkylamines and their derivatives, and also the ethoxylation products of fatty acids, of fatty alcohols, of fatty amines, of fatty amides, of alkylphenols, and of quaternary ammonium salts.

7.5.4.2 *Finishing assistant* — A product added to finishing compounds to improve fluidity, body and/or stability and to modify the finishing in a desired way.

NOTE — These products include, among others, sulphated oils and greases, and products mentioned under the heading of preparing agent.

7.5.4.3 *Fulling assistant* — A product intended to facilitate and to regulate the formulation of felt.

NOTE — Generally, the fibres are made more slippery by surface active agents or preparations containing them, such as soaps, alkylsulphates and fatty acid condensates, possibly in conjunction with mineral or organic swelling agents.

7.5.4.4 *Mercerizing assistant* — A product used to improve the wetting power of mercerizing dyes and thus to accelerate their uniform penetration into the fibres.

NOTE — These products are wetting agents which are stable in highly concentrated lyes; they are based partly on a component which is effective as a surface active agent and as an emulsifier in lyes (alkylsulphates of low molecular weight, highly sulphated oils, cresols, xylenols) and partly on an anti-foaming and wetting substance, itself insoluble in lye, but made soluble by hydrotropy, for example, butyl glycol, ethoxylated amines, etc.

7.5.4.5 *Scrooping agent* — A product which gives textile articles the desired finish from the point of view of feel and sheen.

NOTE — These products arc generally those mentioned under the heading of preparing agent.

7.5.4.6 *Softening agent* — A product used to make processed textiles more flexible and consequently to obtain a given feel. It is also used as an additive in sizing, finishing and dye baths, etc.

NOTE — These products are generally surface active agents or preparation based on greases and oils with suitable emulsifying agents. Brightening agents may also be used.

7.5.5 *Other Auxiliary Products for Textiles*

7.5.5.1 *Anti-foaming agent for the textile industry* — A product which combats the formation of foam or which considerably reduces its stability. In the textile industry, it is used particularly in sizing, finishing and dye baths, in printing pastes, etc.

NOTE — These products include, among other things, certain surface active agents and preparations containing them, for example, those based on oils, phosphoric acid esters, and alcohols of high molecular weight.

7.5.5.2 *Assistant for desizing and for removal of printing thickeners* — A product which accelerates the removal of print thickeners as well as the removal of sizes of starch products, possibly combined with linseed oil, or of other sizes based on linseed oil.

For this purpose, appropriate surface active agents such as wetting agents or detergents may be added to agents based on enzymes.

Similarly, the removal of linseed oil or of sizes based on linseed oil is facilitated by the use of surface active agents - as indicated above - in association with solvents and/or oxidizing agents.

7.5.5.3 *Bleaching assistant* — A product which makes it possible to accelerate bleaching operations and to make the effect more homogeneous.

NOTE — These products are generally surface active agents. mainly wetting agents which are stable in bleaching baths.

7.5.5.4 *Carbonizing assistant* — A product facilitating and accelerating the penetration of carbonizing agents (acids or precursors of acids) into the vegetable impurities in wool, in order to promote their destruction during subsequent heat treatment.

NOTE — These products are wetting agents with sufficient stability in the presence of acids.

7.5.5.5 *Detergent for the textile industry* — A product used in the textile industry to eliminate fats and soiling matter on textiles during manufacture and finishing. Its composition and/or its formulation meet the requirements for various stages of the work, for example for scouring raw wool, yarns or pieces and for the back-washing of dyed and printed fabrics, etc.

NOTE — These products are surface active agents or compounds containing them, such as soaps, alkylsulphates. alkylsulphonates, fatty acid condensates, alkylarylsulphonates, polyglycol esters and ethers.

7.5.5.6 *Emulsifying agent for the textile industry* — A product which enables or facilitates the formation of an emulsion. In the textile industry, it is generally used in the preparation of batching, scrooping and/or preparation agents, winding oils, etc, in order to obtain special effects.

NOTE — These products are or contain surface active agents such as soaps, alkylsulphates, alkylsulphonates, fatty acid condensates, alkylarylsulphonates, polyglycol esters and ethers, esters of fatty acids and polyhydroxyl compounds.

7.5.5.7 *Fibre-protecting agent* — A product used for preserving fibres, particularly animal fibres, during the operations of bleaching, dyeing and stripping.

NOTE — These products are based, for example, on degraded proteins, fatty acid and protein condensates, ammonium alkylsulphates and alkylsulphonates and lignosulphonates.

7.5.5.8 *Kier boiling assistant* — A product intended to increase the effectiveness and rate of processing, with alkaline lye, water, salt solutions or acid solutions, of materials made of cellulose fibres.

It is applied, for example, in the boiling of grey cotton (with or without pressure), in scouring of linen, and to render cotton articles hydrophilic in a continuous process, etc.

NOTE — These are generally special wetting products, often mixed with solvents.

7.5.5.9 *Preparation agent* — A product intended, in general, to make textile materials better suited to undergo a subsequent operation, for example spinning, winding, knitting, etc. Some of these products are also used as scrooping agents in finishing processes.

NOTE — These products generally are surface active agents or combinations with oils and greases. The surface active agents used include, for example, sulphated oils and greases, alkylsulphates, esters and amides of fatty acids, fatty amine condensates, and also the ethoxylation products of fatty acids and fatty alcohols, fatty amides or fatty amine condensates.

7.5.5.10 *Spotting agent* — A product intended to remove local soils on textiles. A distinction is drawn between 'dry' and 'wet' spotting agents, depending on whether they act in a solvent or an aqueous medium.

NOTE — These products are mainly preparations based on solvents and surface active agents, with emulsifying and detergent properties, such as amine soaps, alkylsulphates, alkylsulphonates, fatty acid condensates, alkylarylsulphonates, polyglycol esters and ethers.

7.5.5.11 *Wetting agent for the textile industry* — A product which, when added to a solution, increases the wetting power of the latter. In the textile industry, it promotes wetting and penetration of textiles by water or aqueous solutions.

NOTE — These products are or contain surface active agents such as sulphated oils, fatty acid esters and amides, and also alkylsulphates, alkylsulphonates, fatty acid condensates, esters of sulphosuccinic acid, polyglycol esters and ethers.

7.5.5.12 *Winding oil* — A product intended to render yarns suitable for winding and for subsequent textile operations, such as knitting, by making the yarns more flexible and slippery.

NOTE — These products, are oils, or oils which are emulsifiable in water, which can be prepared with the aid of surface active agents such as oil-soluble polyglycol esters or ethers.

7.6 Dry Cleaning

7.6.1 *Dry Cleaning Detergent* — A product designed to increase (intensify) and amplify the cleaning power of organic solvents by introducing water into the organic medium, thereby extending the cleaning power of the system of hydrophilic soil.

7.6.2 *Prebrushing Agent* — A preparation containing surface active agents which is used, either concentrated or mixed with water and/or solvents, for the preparatory treatment of stained or heavily soiled areas on textile, leather articles and furs. Application by brushing or spraying before cleaning in machine. Prebrushing agents must be completely removable from the articles treated by rinsing in the following cleaning bath.

7.6.3 *Prespotting Agent* — A product containing, in most cases, a surface active agent, used for the preparatory treatment of specific stains on textiles, furs and leather articles.

7.6.4 *Spotting Agent* — A product used to eliminate stains which have not been removed by dry cleaning or washing.

7.6.5 *Water-dispersing Power* — The effectiveness of a dry cleaning detergent to bring about a homogeneous dispersion of water in organic solvents, either by solubilization or by emulsification.

7.6.6 *Water-emulsifying Power* — The maximal amount of water which a dry cleaning detergent is able to emulsify in order to form a W-O emulsion that is sufficiently stable.

NOTE — The emulsion is sufficiently stable for the intended purpose if it persists for at least 15 min.

7.6.7 *Water-solubilizing Power* — The maximal amount of water which a dry cleaning detergent is able to solubilize in an organic solvent.

7.7 Other Applications

7.7.1 *Cutting Oil* — A lubricating compound, emulsifiable or not, which facilitates the work of machine tools and the dissipation of heat produced.

NOTE — It may contain an additive imparting anticorrosion properties.

7.7.2 *Detergent Lubricating Oil* — A lubricating compound, generally based on mineral oils and surface active agents, which facilitates the suspension or resuspension of solid particles forming during the operation of an internal combustion engine.

8 GENERAL TERMS NON-SPECIFIC TO THE FIELD OF SURFACE ACTIVE AGENTS

8.1 Apparent Density — The mass of unit apparent volume.

8.2 Apparent Volume — The volume determined by the exterior limits of a quantity of substance, under the experimental test conditions. This volume includes possible bubbles, pores and interstices.

8.3 Autoxidation — A chemical reaction involving the unaided coupling, either fast or slow, of molecular oxygen with an organic or inorganic compound.

8.4 Bubble — A volume of gas enclosed by a thin envelope of liquid.

8.5 Chelate of a Metal Ion — A metallic complex in which the activity of the metal ion is suppressed by chelation.

8.6 Chelating Power for Metal Ions — The effectiveness of certain molecules to form a chelate with metal ions.

8.7 Chelation of a Metal Ion — The formation of complexes in which a metal ion is held in a ring structure, with one or more molecules having several electron donor groups.

8.8 Complexing Power for Metal Ions — The effectiveness of certain molecules to transform a metal ion into a new complex ion in which the metal ion loses its ionic identity.

8.9 Complexing of a Metal Ion — The transformation of a metal ion into a new complex ion by the action of molecules having at least one electron-donor group.

8.10 Dehydration

a) A physical operation resulting in the removal of all or part of the water bound to a product.
b) A chemical reaction resulting in the removal of one or more molecules of water from a compound.

8.11 Reversible Hydrolysis — The action of water on ions from a dissolved salt, by which a state of equilibrium is established in which both ions and molecules of acid or base capable of forming the salt coexist. The molecules of acid or base can revert to the ionic state when the conditions in the medium change. Reversible hydrolysis is particularly observed in the case of salts of weak organic acids or weak organic amines, containing important hydrophobic radicals.

8.12 Saponification — A chemical reaction permitting the separation of an ester into its constituent parts, acid and alcohol or possible phenol, by the action of a base, with the formation of a salt from the acid.

8.13 Sequestering Power — The effectiveness of certain substances to keep cations in solution, in a more or less liable condition, so that the reactions of the cations are then, for the most part, masked.

8.14 Sequestration — The 'masking' of metallic ions dissolved in a medium, the ions being normally liable to form precipitates in the presence of certain reagents. The 'masking' is accomplished by the formation of complexes which remain generally in solution in the medium.

8.15 Unsaponifiable Matter — The whole of the constituents, soluble in fatty matter and insoluble in water, which cannot be modified by a saponification reaction producing a salt.

NOTE — In practice and for analytical determination - the whole of the product present in the substance analyzed which, after saponification of the latter with an alkaline hydroxide and extraction by a specified solvent, remains non-volatile under the defined conditions of test.

8.16 Unsaponified Matter — A saponifiable substance which has survived a saponification reaction.

8.17 Unsulfated Matter — A sulphatable substance which has not become sulphated in a sulphation reaction and/or has been converted into an unsulphatable product during this reaction.

8.18 Unsulphatable Matter — A constituent which is not capable of undergoing a sulphation reaction.

8.19 Unsulphonatable Matter — A constituent which is not capable of undergoing a sulfonation reaction.

8.20 Unsulfonated Matter — A sulphonatable substance which has not become sulphonated in a sulphonation reaction and/or has been converted into an unsulphonatable product during this reaction.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Soaps and Other Surface Active Agents Sectional Committee, CHD 25

Organization	*Representative(s)*
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Deputy Director (Chem), BIS

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